

## Observations on Copulation in the New Zealand Grapsid Crab *Hemigrapsus crenulatus* (M.Edw.)

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KNUDSEN IN THIS JOURNAL (1964a:9, et seq.), and elsewhere (1964b), recently summarized existing knowledge of copulation and sperm transfer in the brachyuran crabs. In brief, he was able to generalize from the few published records that in Cancroid crabs (Xanthidae and Cancridae) there could be elaborate courtship prior to the female moult, copulation occurred while the female was in the soft-shell condition, and the typical position was male-over-female. In grapsid and majid crabs, however, there appeared to be little or no courtship, copulation occurred while the female was in the hard-shell condition (in the only record of the majid *Pugettia producta* the female was even ovigerous), and in contrast to the Cancroids the typical position was female-over-male.

The first record of copulation in the widespread family Grapsidae was that of Hiatt (1948) for the northern Pacific, American, and Asiatic species, *Pachygrapsus crassipes* Randall. Additional details for this species are given by Bovbjerg (1960). He describes a limited amount of precopulatory courtship as an extension to Hiatt's data. The only other records in this family appear to be those of Knudsen (1964a) for the North American West Coast species *Hemigrapsus nudus* (Dana) and *H. oregonensis* (Dana). Following Knudsen's plea (1964b:41) for further detailed observations on brachyuran copulation, these notes on the New Zealand species, *Hemigrapsus crenulatus* (H. Milne Edwards), are presented as a partial description of mating in this southern shore crab.

*H. crenulatus* is a common, medium-sized grapsid of intertidal mud flats and similar protected environments in New Zealand (see Bennett, 1964:81 and Dell, 1963:54), and also occurs in similar habitats in southern Chile (Garth, 1957:97). The following notes were

made by the author during field work in 1954 on the extensive intertidal flats to the east of the Hutt River mouth, Wellington Harbour, in an area now completely "reclaimed" and developed for industrial building.

On 11 September 1954, *Hemigrapsus crenulatus* was found to be common under pieces of wood and among algae and shells on intertidal flats at the mouth of the Hutt River. Several specimens, including ovigerous females, were brought to the laboratory for observation. After being confined together in a collecting jar for some hours, two specimens were seen to be in copulation. The jar was dry, as the water they had been in for some time had just been discarded.

The female was slightly smaller than the male, and ventral surface was placed to ventral surface. The female was slightly more posterior than the male. The latter enclosed the female within its walking legs, which were right around those of the female and on to the dorsal surface of her carapace. The female's legs were stretched out laterally, not attempting to grip the male. The male's chelipeds were held out aggressively over the anterior part of the carapace of the female. The latter's chelipeds were folded under her. The female abdomen was opened right back and the extreme end was hooked on to the posterior edge of the male carapace. When I looked between them, the male abdomen appeared to be opened out, as I could see an open groove. (I did not observe the position of the pleopods.) The mouthparts of the male were working rapidly. The pair remained as described for about 10 minutes; they could move whichever way up they were, and they were considerably disturbed by the other crabs in the container. When the pair broke apart the male took up an aggressive stance, lying over the dorsal surface of the female.

The behaviour described above supports as far as possible Knudsen's generalizations for

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the Grapsidae; no courtship was observed, the female was in the hard-shell condition, and it appears that, at least some of the time, the position was female-over-male. This latter point, however, is not specifically covered in the notes, the only record now of these observations, although the remark "they could move whichever way up they were" implies that both positions were seen. This was probably due to the disturbed nature of the relationship. We can assume that the female was not ovigerous, because if she had been this extraordinary fact would have been clearly visible under the folded-back abdomen.

Allowing for the incomplete nature of these observations, copulation has now been recorded in the Grapsidae for three species of the genus *Hemigrapsus* and one of *Pachygrapsus*, all from the Pacific area.

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